

STAT 621 Chapter 2

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1 Measurement scales

- Nominal scale
- Ordinal scale
- Interval scale
- Ratio scale

2 Random samples

Def 1: p. 70, via “equally likely draws”

Def 2: p. 71, via i.i.d random variables

with replacement vs without replacement

Effectively “without replacement”: a small sample without replacement out of a large population.

statistic: a function of a random sample

a random sample viewed as a multivariate random variable, which has a corresponding sample space

statistic viewed as a random variable: it assigns a value to each point in the sample space of the random sample (which is a multivariate random variable)

order statistic

3 Estimation

3.1 Empirical distribution function

Example Ex. 1, p. 79.

sample quantiles

3.2 Estimator, estimate

sample mean

sample variance, sample standard deviation

distribution of an estimator (which is a statistic, i.e. random variable)

mean of an estimator, unbiased estimator

variance of an estimator, standard error

point estimator vs interval estimator

3.3 Confidence interval

approx CI based on CLT, large n (say 30)

Example Ex. 5, p. 86.

3.4 Bootstrap

“computer-intensive statistics”

3.5 Summary

parameter estimation in general (p. 88)

4 Hypothesis testing

4.1 Basic terminology (p. 95–96)

alternative hypothesis

null hypothesis

test statistic

decision rule

accept, or fail to reject, the null

Example Ex. 1, p. 96

simple/composite hypothesis (p. 97)

critical region, rejection region (p. 98)

two-tailed tests, one-tailed tests, upper-tailed tests, lower-tailed tests

4.2 Error types

Type I error: def 4, p. 98.

Type II error: def 5, p. 99.

Level of significance, α : def 6, p. 99.

Power, $1 - \beta$: def 8, p. 100.

Comparison of the two types of errors: known or unknown?
unique? controlled by the user? (These questions have to do
with whether the hypotheses are simple or composite.)

4.3 Null distribution

def 7, p. 989.

4.4 p -Value

def 9, p. 101.

Example Ex. 2, p. 101.

4.5 Some properties of hypothesis tests

Power function

Relative efficiency

5 Remarks on parametric vs nonparametric methods

p. 114–118.

A definition of nonparametric methods: p. 118.